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Horizontal cooperation in disaster relief logistics: benefits and impediments

Sabine F. Schulz
Technische Universität Berlin, Berlin, Germany, and
Alexander Blecken
Heinz Nixdorf Institute, Paderborn, Germany

Abstract

Purpose – The purpose of this paper is to further the understanding of opportunities involved in horizontal cooperation in disaster relief logistics. The potential and realized benefits of horizontal cooperation in disaster relief logistics, as well as related impediments are investigated.

Design/methodology/approach – Case study research into three cooperative humanitarian organization initiatives.

Findings – To a large extent, the same potential synergies exist in the humanitarian as in the private sector, but not all of the potential benefits have yet been realized. Humanitarian organizations focus less on cost aspects than on lead-time and quality improvements. It is apparent that smaller organizations can benefit most from a cooperative approach. Four main impediments to a cooperative approach are identified. These concern: the perception of logistics as one of the organization's own core competences, cultural differences and mutual mistrust, a lack of transparency regarding the potential and existing benefits and inadequate relief capacities.

Research limitations/implications – Research on horizontal cooperation in logistics is strengthened. A service provider model is selected as the mode of horizontal cooperation and the findings are valid only for this model.

Practical implications – The presented benefits may be of assistance to humanitarian organizations assessing participation in a cooperation initiative. The indicated impediments may also serve as a guide for humanitarian organizations in horizontal cooperation considerations.

Originality/value – Research on horizontal cooperation in logistics is scarce in both the private sector and the humanitarian domain. It appears that no other rigorous and systematic empirical study comparing existing logistics cooperation initiatives exists as yet.

Keywords Aid agencies, Distribution management, Supply chain management

Paper type Research paper

1. Introduction

There is a growing need for efficient international disaster response, as can be seen from related figures that exhibit an alarming but clear picture: the total number of recorded natural disasters has multiplied more than sixfold over the last 30 years (CRED, 2007, 2008). Developments like climate change, environmental degradation and rapid urbanization are expected to increase the number of natural disasters by a further multiple of five over the next 50 years (Thomas and Kopczak, 2007). Despite an observed growth, it is doubtful whether the available funds for disaster relief operations will increase in the same proportion as the number of disasters and people affected by them.

Hence, it is apparent that the humanitarian community may need to handle future disaster response operations with less money for each beneficiary. In order to improve

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or even maintain the level of assistance to those affected, efficiency and effectiveness of the response must be improved in terms of cost, time and quality. The logistics function can constitute a main improvement lever in this regard because it accounts for up to 80 percent of the total funds spent in disaster response (Trunick, 2005; van Wassenhove, 2006). Yet, logistics has frequently been regarded as a back-office function over the last few decades and has only recently started to move into the focus of the organizations' attention (Thomas and Kopczak, 2005) and thus leaves ample room for improvement.

The characteristics of and challenges in humanitarian supply chains have been analysed, for instance, by Tufinkgi (2006), Thomas and Kopczak (2007), Kovács and Spens (2007, 2009), Schulz (2009) and Blecken (2010). Kovács and Spens (2007) denote humanitarian logistics as a "mixed array of operations" including disaster relief as well as long-term support for developing regions, i.e. as a response to various catastrophes. Thomas and Kopczak (2005) define humanitarian logistics as:

> [...] the process of planning, implementing and controlling the efficient, cost-effective flow and storage of goods and materials, as well as related information, from the point of origin to the point of consumption for the purpose of alleviating the suffering of vulnerable people. The function encompasses a range of activities, including preparedness, planning, procurement, transport, warehousing, tracking and tracing, and customs clearance.

A lack of inter-organizational cooperation and coordination is pointed out in various articles and practitioner reports (Thomas and Kopczak, 2007; van Wassenhove, 2006; Oloruntoba, 2005; Völz, 2005). van Wassenhove (2006), for instance, points out that to cope with the rising number and increasing complexity of disasters, the response will call for more coordination and specialization of tasks not only *vis-à-vis* the armed forces, governments and private business, but also between humanitarian organizations among each other. Donors, too, are showing a growing interest in and demand for cooperation among humanitarian organizations operating in the same disaster regions, with a view to reducing duplications of effort. The following particular aspects become apparent: first, coordination between humanitarian organizations helps to increase the impact or efficiency of the overall operation. Second, the lack of, or sub-optimal coordination wastes resources and/or valuable response time. Yet, coordination between humanitarian organizations is difficult due to a variety of barriers. Amongst other factors, cooperation and coordination between humanitarian organizations is affected by humanitarian organizations' mandates, their organizational structure and employed IT systems, perceived or actual competition between the humanitarian actors, and timely exchange of accurate information before and during humanitarian operations.

The objective of this paper is to identify potential benefits of and impediments to horizontal logistics cooperation between humanitarian organizations. In order to support this exploration, this paper is structured in four distinct sections. In Section 2, relevant sources on horizontal cooperation both in commercial and humanitarian contexts are reviewed. In Section 3, the research method is outlined, including case study research to investigate the research questions. The case studies are also briefly introduced. In Section 4, potential synergies and perceived benefits, and challenges of horizontal cooperation are identified through a cross-case analysis. Also, facilitating factors are determined which can help overcome the identified impediments. Section 5 provides a conclusion and suggests a way forward in facilitating horizontal cooperation of humanitarian organizations.

2. Cooperation within disaster relief logistics

Based on the definitions of Woratschek and Roth (2005) and Höfer (1997), "cooperation" in this paper embraces all possible forms of inter-organizational interaction that are rooted in common intentions and lead, via negotiations, to agreements whereby the partners are and remain legally, and with certain restrictions, economically independent. While vertical cooperation involves different actors along the value chain of one industry, such as suppliers, manufacturers, distribution centers and customers, horizontal cooperation takes place between entities operating at the same level in the market.

Logistics research within the private sector shows that horizontal cooperation between individual business entities is able to produce overall and individual benefits, for example, through the realization of economies of scale (Arnold and Essig, 1997; Essig, 1999; Bahrami, 2003; Cruijssen *et al.*, 2007). In particular, with the aid of a large-scale survey and in-depth follow-up interviews, Cruijssen *et al.* (2007) investigated the potential benefits of and impediments to horizontal cooperation between logistics service providers (LSPs). The authors formulated a number of opportunities offered by horizontal cooperation:

- Horizontal cooperation increases the company's productivity for core activities, e.g. decrease in empty hauling, better usage of storage facilities, etc.
- Horizontal cooperation reduces the costs of non-core activities, e.g. organizing safety trainings, joint fuel facilities, etc.
- Horizontal cooperation reduces purchasing costs, e.g. vehicles, on-board computers, fuel, etc.
- LSPs can specialize while at the same time broadening their services.
- LSPs can offer better quality of service at lower costs, e.g. in terms of speed, frequency of deliveries, geographical coverage, reliability of delivery times, etc.
- Horizontal cooperation enables individual LSPs to tender with large shippers on larger contracts.
- Horizontal cooperation helps to protect the company's market share.

Likewise, Cruijssen *et al.* (2007) also indicated impediments to horizontal cooperation, with the specific context of horizontal cooperation between LSPs as follows:

- It is hard to find commensurable LSPs with whom it is possible to cooperate for (non-) core activities.
- It is hard to find a reliable party that can coordinate the cooperation in such a way that all participants are satisfied.
- It is hard for the partners to determine the benefits or operational savings due to horizontal cooperation beforehand.
- Partners find it hard to ensure a fair allocation of the shared workload in advance.
- A fair allocation of benefits to all the partners is essential for a successful cooperation.
- When a LSP cooperates with commensurable companies, it becomes harder to distinguish itself.

- Over time, smaller companies in the partnership may lose clients or get pushed out of the market completely.
- When benefits cannot be shared in a perceived fair way, the larger players will always benefit most.
- Cooperation is greatly hampered by the required indispensable information and communication technology (ICT) investments.

Literature on vertical cooperation in logistics is quite extensive. Gibson *et al.* (2002) indicate as main areas of research the identification of potential benefits, e.g. Bowersox (1990) and Gentry (1993); the investigation of critical success factors, e.g. Bowersox *et al.* (1989), La Londe and Cooper (1989), Tate (1996) and Gibson *et al.* (2002); as well as partner selection and evaluation criteria, e.g. Byrne and Markham (1991). Contributions on the influence of information sharing within vertical logistics cooperation were provided by Lee *et al.* (1997) and Chen *et al.* (2000).

On the other hand, the academic research on horizontal cooperation in logistics is limited. Exceptions of industries in which horizontal cooperation has been investigated are maritime shipping (Sheppard and Seidman, 2001), and the airline industry (Fan *et al.*, 2001; Oum *et al.*, 2004), where horizontal cooperation is quite common and well researched. Cruijssen *et al.* (2007) indicate that only few further publications on horizontal logistics cooperation exist. These concentrate on either quantifying the cost-saving potential through cooperation, or reporting good practices in successful cases. Cruijssen *et al.* (2007) provide empirical evidence on the opportunities for horizontal cooperation in logistics, as well as major impediments to setting up and maintaining logistics partnerships in practice. Mason *et al.* (2007) find that strategies for improving transport and supply chain performance often involve collaboration of various forms. Different facets of cooperative sourcing within different industries are investigated by Arnold and Essig (1997), Arnold (1998), Essig (1999), Essig (2000), Hendrick (1998), Scheuing (1998) and Beimborn (2006).

Collaboration between humanitarian organizations can take place at different stages along the relief chain (Oloruntoba, 2005), e.g. during contingency planning, need assessment, appeals, transportation management, or last-mile distribution. While collaboration during an actual disaster (Thomas and Kopczak, 2007), especially at field level, seems to be more common, and has been enhanced through the setup of the UN Joint Logistics Center(Samii and van Wassenhove 2003a; 2003b; 2003c), there is a specific need for better, continuing collaboration after an operation, in preparation for the next one (Thomas and Kopczak, 2007). Particularly, only limited cooperation is reported or documented during the preparation phase of the disaster relief lifecycle.

In this paper, the potential benefits of and impediments to horizontal logistics cooperation between humanitarian organizations in connection with the permanent supply chain infrastructure are explored. This includes the supply chains up to the point of entry, i.e. the first airport or seaport in the disaster-affected area. The infrastructure encompasses all long-term or permanent facilities and equipment (e.g. procurement offices and warehouses with pre-positioned stock), employed or available staff, and standard processes and systems, all of which prepare and secure the organization's responsiveness to any disaster relief operation or on-going project. The supply chain infrastructure has to be set up during the preparation phase, that is, before the occurrence of a disaster event. Focus is put on the permanent supply chain infrastructure

since this the readiness for coordination and use of synergies between humanitarian organizations should be comparatively high in this phase due to the scarcity of funds for disaster preparedness. Moreover, supply chain infrastructure has a significant influence on the performance of the supply chain.

Owing to the latest developments within the humanitarian sector, where individual humanitarian organizations are taking the lead and acting as LSPs for others, a horizontal cooperation model that follows a service provider approach is selected and forms the core of the research investigations. The focus is further put on cooperation regarding the main tasks: procurement, warehousing and transportation.

3. Case studies

3.1 Research method

Since research on horizontal cooperation in general, as well as in the context of disaster relief logistics and the community of humanitarian organizations, is still in its early stages, case study research seems to be one of the most appropriate research methods. Here, the selection of case studies and interview partners is guided by the aim of identifying patterns and schemes for successful inter-organizational cooperation initiatives as well as existing difficulties and impediments.

Eisenhardt (1989), Yin (1994) and Ellram (1996) describe this exploratory research method, focusing on qualitative research:

> In general, case studies are the preferred strategy when "how" and "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context (Yin, 1994).

Moreover, a unique strength of case study is its ability to include a full variety of evidence – archives, documents, interviews, questionnaires and observations (Yin, 1994). Since different cooperation initiatives with respect to disaster relief logistics have recently been started within the humanitarian sector, a multiple-case design is selected with "inter-organizational cooperation initiatives for disaster relief logistics" as the single unit of analysis. While comparability is enhanced through the selection of similar cooperation setups, the differences between the concepts and the driving actors (humanitarian organizations and donors), but also the varying perspectives within the group of humanitarian organizations (UN, Red Cross and Red Crescent Movement and non-governmental organizations (NGOs)) create the necessary differentiation and variety for data triangulation.

In this paper, validity is ensured by combining the results of desk research with the data received from semi-structured interviews, internal documentation and presentations obtained and published information. In total, 38 interviews were conducted and where possible combined with site visits. The interviewees generally held the following positions: initiator or head of the cooperation initiative, procurement officer, logistics officer, warehouse manager, and (potential) customers/participants/users of the cooperation. The analysed internal documents range from annual reports and internal evaluations through procurement orders received, inventory lists and supply agreements to internal presentations and documents providing important information on historic decisions and the handling of customer relations. The case study reports are reviewed by key interviewees and interpretations are discussed with them in follow-up interviews. Reliability is ensured by comprehensive collection of all interview notes and any other material obtained.

Owing to a lack of current performance data, the actual unit of analysis is the perception of benefits and impediments linked to the cooperation initiative from the perspective of the various stakeholders involved, i.e. donors, service providers and current or potential customers. This unit of analysis forms the basis for a cross-case synthesis. Cross-case synthesis is used to analyse the cases and to test propositions that are based on research results from Cruijssen *et al.* (2007) regarding benefits and impediments for horizontal cooperation in the private sector. The cross-case synthesis allows conclusions to be drawn through a comparison of different aspects across all cases. Word tables display the comparison in a clearly arranged way. Propositions or proposition components (e.g. single benefits or impediments) were thus tested systematically.

3.2 Cooperation format

Various cooperation concepts are presented by Swoboda (2005). The investigated cooperation format follows a service provider approach, in which one cooperation partner acts as LSP for the others. Here, cooperation has the general objective of realizing cost, time and quality improvements through economies of scale and scope as well as process improvements possible through the consolidation of the logistics tasks of different humanitarian organizations. One organization takes on the "service provider" role, while others can participate as "customers". The participation of each player is voluntary and based on its individual decision function. The service provider undertakes tasks in the areas of procurement, warehousing and transportation management. In this way, the separate logistics infrastructures and supply chains are consolidated into common systems. Characteristic for this approach is consideration of the other humanitarian organizations not as partners, but as internal or external customers that are to be provided with professional and high-quality services.

The main reasons for this format choice were twofold. First, this format is up to date and realistic, since variations of it are already being implemented within the humanitarian sector. Second, although this format seems to promise benefits to partaking entities, there are also voices arguing against it, which indicates the existence of impediments of some kind.

3.3 United Nation Humanitarian Response Depots

The United Nation Humanitarian Response Depot (UNHRD) network aims to be able to deliver humanitarian relief items worldwide within 24-48 hours. UNHRD provides storage, logistics support and services to World Food Project (WFP), other UN humanitarian agencies, international humanitarian organizations, governmental and NGOs, thus reinforcing capacity for humanitarian emergency response. Depots are located in Italy, the United Arab Emirates, Malaysia, Panama and Ghana. The typical flow of goods for any depot can be simplified to show the general concept (Figure 1).

Within the UNHRD network, WFP acts as service provider for the humanitarian community on a non-profit basis. Other humanitarian organizations can register as "authorized users". Various opportunities for cooperation exist in the areas of storage, procurement and transportation.

"Storage" is the core function of the HRDs. Here, different areas and instruments of cooperation exist. First of all, the humanitarian community is invited to store emergency response stocks at the individual HRDs in the network free of charge, and to thereby save

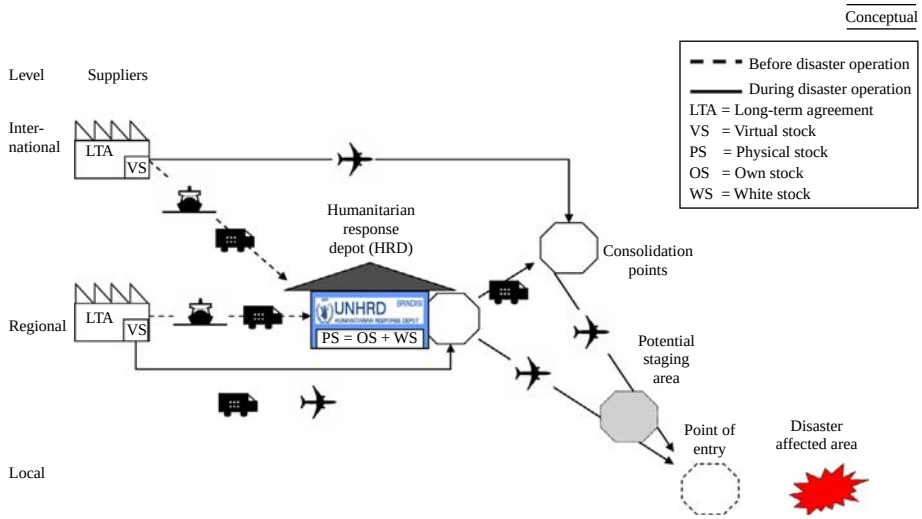

Figure 1.
Supply chain design for each humanitarian resource depot

the cost of setting up and running their own warehouses. A further instrument of cooperation is the "white stock", which can be regarded as a common emergency capacity. Since the stock is not yet branded with the logo of any organization, every user willing to pay for it may use it. In addition to the use of white stocks, the coordination office of the UNHRD encourages to carry out "stock loans" between users. Prerequisite or at least facilitator for stock loans is the willingness of all users to keep stock that meets common standards and is in an unbranded condition, so that the borrowing organization can brand it with its own logo before dispatching it.

WFP also offers to conduct "procurement" on behalf of the users. Through the establishment of long-term agreements (LTAs) with a variety of suppliers covering the core products, time-consuming tendering processes only have to be carried out once, for the selection of LTA suppliers, and not individually for every purchase order. The product quality can be better assured, and by consolidating the purchasing volume of different users, larger volumes are possible, resulting in price discounts from which all users can profit.

Economies of scale can be realized among HRD users also within "transportation". During carriage of goods from an LTA supplier to the HRD, consolidation of the consignments for different users helps to achieve full truck loads faster than when each organization "saves up" for a full truck load on its own. Moreover, consolidation benefits are also generated over the transportation section between the HRDs and the point of entry to a disaster-affected area. If one organization does not have enough supplies and/or equipment to fill up a complete aircraft, the freight cost will be less if other HRD users who also plan to ship to this destination use the free space. The combination of different consignments also enables the total freight load to be optimally balanced in terms of volume and weight.

The key data for the UNHRD case are presented in Table I.

3.4 IFRC regional logistics units (RLU)

The International Federation of Red Cross and Red Crescent Societies (IFRC) is part of the Red Cross and Red Crescent Movement, and constitutes the umbrella organization for

Mandate	To support the 24/48 emergency response efforts of UN, international, governmental and NGOs and to support WFP in meeting its corporate goal of being prepared to respond to three large-scale emergencies at any given time
Location of coordination office	Brindisi, Italy
Number of depots/total capacity in m^2	5/25,000 m^2 covered space + 25,000 m^2 open space
Current number of authorized users	20
Number of employees	30
Total annual budget	Max. USD5 million
Services	Standard services (free of charge) and specific services (at cost + 4.5 percent management recovery cost)
Stored products	Programme support stocks and operation support equipment

Note: As of December 31, 2007

Table I.
Key data for UNHRD case

the national societies (NS). Regional Logistics Units (RLUs) were set up to strengthen the disaster response capacity of NS. Three locations were selected for RLU setups: Panama City, Dubai and Kuala Lumpur. The RLUs offer three different kinds of services: logistics services (including storage and transport arrangements), procurement services and logistics technical support. The typical flow of goods for any RLU is conceptually shown in Figure 2.

The RLUs operate as service providers for the IFRC itself, the NS and potentially other humanitarian organizations. While NS are regarded as "internal customers", other humanitarian organizations would be "external customers". Any humanitarian organization operating in line with the mission and principles of the IFRC might become external customer. Although the quality of services is the same for both groups, there might be differences in prioritization, as well as in service charges. The RLU concept offers a range of different opportunities for cooperation, from which the participants are expected to benefit.

For the "procurement" of strategic standard items, framework agreements (FAs) are established with suppliers. These agreements specify product details, prices and transport conditions, guaranteed delivery quantities, packaging information and penalty fees. Response time can be shortened since all important information is specified before the actual need situation. Additionally, the IFRC can calculate with and rely on the capacities specified within the agreement. The supplier guarantees the availability of

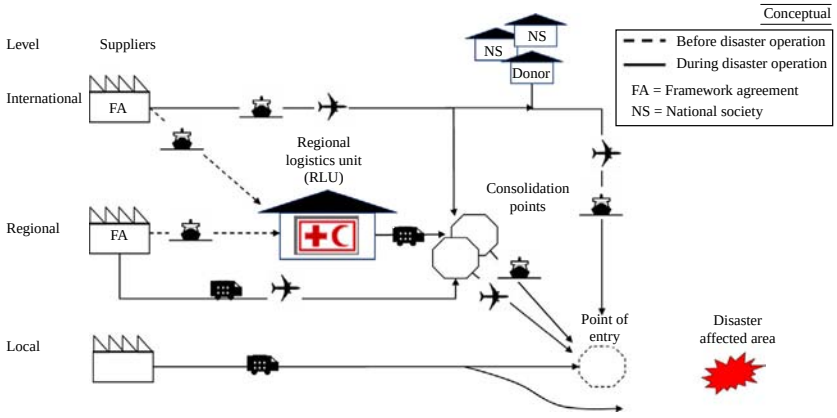

Figure 2.
Supply chain design IFRC

certain quantities on request, or within a certain time period. If the supplier fails to comply with the agreement it must pay a penalty, and risks being excluded from future IFRC purchase contracts. An additional advantage of fixed supply prices within FAs is that they prevent price increases during disaster peak seasons, when all aid agencies are looking for the same supplies. Suitable suppliers for FAs are selected by means of a tendering process. Those offering the best price for the required specifications win the contract. Additional price discounts for certain order volumes are usually not part of the FA.

Besides offering the opportunity to share common warehouse facilities and equipment, joint "storage" creates the possibility of interchanging stocks between customers. If one organization needs more supplies than it has stocked on its own account, it may ask other organizations with stock in the RLU to lend it certain items, which it then replaces as soon as possible. This can increase the flexibility of all customers, but requires the organizations to store their supplies in an unbranded form, so that branding can be postponed up to the time when the supplies leave the warehouse.

Further potential for cooperation exists in the area of "transportation". Supplies from different customers which are destined for the same point of entry of a disaster-affected area can be consolidated and shipped together. Better shipping prices become available and better capacity utilization is possible.

The key data for the RLU case are presented in Table II.

3.5 ECHO humanitarian procurement centers (HPC)

The European Community Humanitarian Aid Department's (ECHO) mandate is to provide emergency assistance and relief to the victims of natural disasters or armed conflict outside the European Union. In order to increase the quality of international disaster relief operations in general and of its partner organizations in particular, ECHO initiated the implementation of humanitarian procurement centers (HPCs).

Humanitarian organizations may apply to receive the status of an HPC. HPCs are "non-profit making, autonomous and professional structures, specialized in the technical and commercial management of supplies necessary for the implementation of humanitarian operations". "They provide technical assistance in procurement to humanitarian organizations, putting at their disposal pre-established stocks,

Mandate	To support national societies in ensuring that there is sufficient logistics capacity in terms of personnel and resources to deliver services in support of disaster preparedness activities and to achieve a response level of delivering an agreed set of standard relief items for a maximum of 5,000 families in 48 hours and a further 15,000 families in 14 days anywhere globally
Location of coordination office	Geneva, Switzerland
Number of depots/total capacity in m^2	3/>4,000 m^2 + x m^2 rented on an as-needed basis
Current number of authorized users	8
Number of employees	~ 40
Total annual budget	~ CHF 2.1 million
Services	Three service groups (service fees: CHF × or at cost + xpercent)
Stored products	Family emergency kits and other (standard) relief items

Table II.
Key data for RLU case

Note: As of April 30, 2008

purchasing and logistics capacity" (ECHO, 2005). Partners are invoiced by the HPCs and can subsequently retrieve their expenditures from ECHO. In addition, they can charge up to 7 percent to ECHO as indirect costs on the total cost charged by the HPC. This may function as an incentive for partners to use the services of HPCs.

The typical flow of goods for any depot is shown in Figure 3. Supply delivery flow number 1 takes place when the humanitarian organization wishes to increase or replenish its own stock level. The deliveries may also come directly from the individual suppliers. Flow number 2 takes place when an HPC responds to an order by drawing on its own (pre-positioned) stock. Alternatively, the HPC may transmit the order to its suppliers, which then deliver directly either to a consolidation point or to the point of entry (flows number 3). Orders passed on to local suppliers will be delivered directly to the point of entry or even into the disaster-affected area (flow number 4).

The role of ECHO is to develop and improve the HPC concept, assess and verify new and existing HPCs, follow up any customer complaints and promote the concept among ECHO partners as well as within the humanitarian community in general. Potential customers of HPCs are all 200 partner organizations of ECHO, as well as European governments that engage directly in humanitarian aid and the procurement of relief supplies and services. The HPC concept creates opportunities for inter-organizational cooperation within procurement, but also with respect to pre-positioning of stocks and transportation capacity.

Through common "procurement" and standardization, better quality of supplies can be obtained. The community of customers can benefit from the knowledge and broad supplier base of the HPC, as well as from its efforts aimed at capacity assurance. In addition, HPCs may be able to negotiate better prices with key suppliers due to higher annual volumes.

The preservation of pre-positioned stock within the HPC "storage" facilities may eliminate the necessity for smaller organizations to set up their own warehouses for pre-positioning.

Moreover, consolidation of intra- and inter-organizational "transportation" may be possible to some extent. Again, better prices with external transportation providers can be negotiated due to higher volumes.

The key data for the HPC case are presented in Table III.

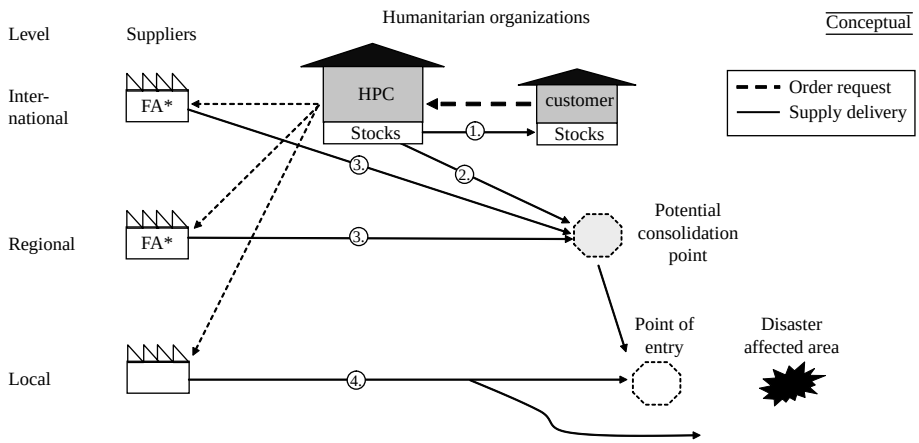

Figure 3.
Supply chain design resulting from HPC concept

Mandate	To provide emergency assistance and relief to the victims of natural disasters or armed conflict outside the European Union. The aid is intended to go directly to those in distress, irrespective of race, religion or political convictions
Office location	Brussels, Belgium
Number of partner organizations	~ 200 (NGOs, international organizations, UN and specialized agencies of EU member states)
Total annual budget	~ EUR 730 million
HPC concept	
Current number of HPCs	Nine
HPC services	Procurement and consulting services and transportation management (service fees: cost +7 percent)
Sourced products	Standard relief items and support equipment

Table III.
Key data for HPC case

Note: As of March 31, 2008

4. Results

4.1 Benefits

The cross-case investigation on potential, realized and expected benefits is presented in detail in Table IV. Overall, it can be observed that all types of synergy resulting from horizontal cooperation collected from the private sector are perceived to apply to cooperation between humanitarian organizations as well, but that not all resulting types of benefits have yet been realized. In particular, this applies to cost reductions through the consolidation of administrative tasks and infrastructure, or the realization of benefits through activity alignment and concentration on different core competencies.

Cost reductions through price stabilization and the extension and decentralization of the warehouse network for pre-positioning supplies and capabilities are perceived as important benefits. However, even greater importance is assigned to lead-time reductions, quality control and the assurance of capacities through consolidation and standardization of procurement volumes via FAs as well as through a streamlining of processes, and the possibility of exchanges of stock between individual humanitarian organizations.

This focus seems to differ from that of horizontal cooperation in the private sector, where the greatest attention is paid to cost reductions, for example, through price discounts. Nevertheless, humanitarian organizations should strive to exploit all kinds of benefits offered by horizontal cooperation. Areas for future focus might be to negotiate price discounts with framework suppliers as well as to increase the level of consolidation between the administrative infrastructures.

Beside these benefits, the case studies reveal three additional kinds of perceived synergy conferring cooperation benefits which have not been found in similar cooperation models in the private sector: Consolidation and priority shipping can reduce the throughput time by releasing pressure on supply chain bottlenecks, cooperation in the preparation phase can facilitate cooperation in later supply chain legs, and transparency of target and existing response capacities can prevent an under, or over, coverage of regions. The discussion of potential benefits indicates that smaller humanitarian organizations, in particular, can benefit from access to logistics services offered by the cooperation which they would not be able to access independently. These are also the participants who are more willing and able to realize cost reductions through the consolidation of administrative infrastructures.

Category	Task	Potential benefits	Sources	Perceived benefit		
				UNHRD network	RLUs	HPC concept
Operational benefits	Procurement	Consolidation of purchasing volume and bargaining power: price reduction/ quantity discounts; improvement of service conditions (e.g. preferred treatment, LTAs, protection against price increases, obtaining other products at lower prices by piggybacking them onto the joint purchases); for smaller organizations: access to a broader range of suppliers (e.g. global sourcing)	Arnold and Essig (1997), Cruijssen *et al.* (2007), Bea (1992), Dichtl (1994), Dyer and Singh (1998), Boutellier and Zagler (2000), Scheuing (1998) and Hendrick (1998)	Yes (realized): cost reduction/postponement through establishment of LTAs, access to LTAs of other UN agencies and use of virtual and white stocks; not only cost focus but also time and quality; prevention of price increases through fixed supply prices in LTAs; benefits especially for smaller organizations	Yes (realized): cost reduction/postponement through establishment of FAs and use of virtual stocks; not only cost focus but rather time and capacity; prevention of price increases through fixed supply prices in FAs; benefits especially for smaller national societies	No/Yes (expected): no focus on cost reduction but on quality control; no cost reductions could be observed for HPC customers; expected cost advantage for HPCs; smaller organizations benefit from supply chain structure of larger ones
		Reduction of administrative costs within procurement through consolidation of administrative tasks such as order processing and supplier relationship management	Production cost economics	No: efficiency of administrative cost structure is not measured; duplications since customers tend to keep their own procurement functions; possibly greater benefits for smaller organizations	No: efficiency of administrative cost structure is not measured; duplications since bigger customers tend to keep their own procurement functions; possibly greater benefits for smaller organizations	No/yes (realized): duplications since customers tend to keep their own procurement functions; simplification of procurement process; possibly greater benefits for smaller organizations
		Cost reduction and quality improvement through early supplier involvement in research and development; cost and time reduction through new information and communication systems	Arnold and Essig (1997)	Yes (realized): no early supplier involvement but software improvements	Yes (realized): early supplier involvement in tent development	n/a
		Inter-organizational logistics compatibility (requirement for stock pooling) through indirect standardization of products, packaging and labeling	(see storage)	Yes (expected): user willingness still low but indirect adaptation	Yes (expected): user willingness still rather low but indirect adaptation	Yes (expected): indirect adaptation to standards set by HPCs

(*continued*)

Table IV.
Overview of potential types of cooperation benefits

Table IV.

Category	Task	Potential benefits	Sources	Perceived benefit: UNHRD network	Perceived benefit: RLUs	Perceived benefit: HPC concept
		Reduction of time, complexity and total acquisition cost through streamlining of processes	E&I (2006), E&I (2007a) and E&I (2007b))	Yes (realized):, e.g. through staff availability and staging areas; especially for smaller organizations	Yes (realized):, e.g. through good accessibility and tracking and tracing of goods through HLS; especially for smaller NS	Yes (realized):, e.g. through permanent procurement structures of HPCs; especially for smaller organizations
	Storage	Reduction of facility and administrative cost within storage through consolidation of storage facilities, equipment and personnel	Production cost economics, (Simchi-Levi *et al.*, 2000)	Yes (realized)/no: users save storage cost but tend to keep own warehouse infrastructure	No: NS tend to keep own warehouse infrastructure	n/a: indirect benefits by avoiding duplication costs
		Extension/decentralization of warehouse network: cost and time savings through reduction of average distance from the warehouse to the destination and using cheaper transport modes for deliveries to the warehouse	Simchi-Levi *et al.* (2000)	Yes (realized): perception based on experience and simple scenario cost calculations	Yes (realized): as documented by the Yogyakarta case report (Cuckow, 2006)	n/a
		Increase of flexibility through stock exchanges, cost savings and increased availability through decrease of certain stock positions by stock and risk pooling	Simchi-Levi *et al.* (2000) and de Kok *et al.* (2003)	Yes (realized): part of acclaimed benefits and already realized several times	Yes (realized): already realized several times	n/a: possibility of stock swaps at later stages in the supply chain
	Transportation	Consolidation of purchasing volume and bargaining power: price reduction/ quantity discounts, improved service conditions	Bahrami (2003); see procurement	Yes (realized): lower prices through use of UNHAS/IL-76; but no transport LTAs in place	Yes (realized): lower prices through volume consolidation; but no transport FAs in place	Yes (expected): lower prices through volume consolidation (but no results yet)
		Reduction of administrative costs within transportation through consolidation of administrative tasks such as transport and supplier management	Production cost economics; see procurement	No: efficiency of administrative cost structure is not measured; duplications since customers tend to keep their own transport function; possibly larger benefits for smaller organizations	No: efficiency of administrative cost structure is not measured; duplications since customers tend to keep their own transport function; possibly larger benefits for smaller organizations	No: duplications since customers tend to keep their own transport function; possibly larger benefits for smaller organizations

(*continued*)

Category	Task	Potential benefits	Sources	Perceived benefit: UNHRD network	Perceived benefit: RLUs	Perceived benefit: HPC concept
		Reduction of transportation unit cost as well as the unit costs for issuing and receiving the goods through consolidation of shipments	Bahrami (2003)	Yes (realized): full planeloads through joint shipments	Yes (realized): full planeloads through joint shipments	No: expected to be marginal
Strategic benefits	Market position	Enhancement of market power or competitive position and protection of market share	Cruijssen *et al.* (2007)	Yes (realized): broad and increasing donor support	Yes (realized): existing donor support and winner of the 2006 "Supply Chain Excellence Award"	Yes (realized)/no: initiative promoted by a donor itself
		Cost reduction through concentration on core competencies; better customer approach with full catalogue of services	Cruijssen *et al.* (2007)	No: does not wish to interfere in users' area of authority	No: does not wish to interfere in area of authority of their NS	n/a
Additional benefits		Consolidation and priority shipping: reduction of throughput time by releasing pressure on supply chain bottlenecks; delivery of most needed goods first		Yes (realized): through joint establishment and use of staging areas		
		Cost, time and quality improvements through better cooperation in later supply chain sections – facilitated by cooperation during earlier supply chain sections		Yes (expected): better mutual acquaintance of users will facilitate general cooperation willingness		
		Transparency of the target response capacity as well as existing supplies. Hence, avoidance of under- or over-coverage of regions		Yes (expected): starting with stock transparency of all UNHRD users, later invitation to other humanitarian organizations to join	No: but different opinions exist: no interference in area of authority of NS versus idea of total stock transparency	Yes (realized)/no: overview of individual capacities of all HPCs exists, but no plans for active management in the future

Table IV.

4.2 Impediments

The cross-case investigation on perceived impediments to horizontal cooperation is presented in detail in Table V. Overall, the cross-case analysis reveals that most impediments valid for the private sector also apply to humanitarian operations. Only the three impediments of inter-organizational competition, unfair benefit allocation and lack of ICT are not perceived to exist. Reasons for this perception are, for example, the impression that the cooperative attitude of organizations has improved, the circumstance that humanitarian organizations are in general not permitted to make a profit, and the fact that basic ICT solutions such as e-mail and telephone connections are used and are compatible between organizations.

Two additional impediments have been identified which have not been previously discussed in literature: first, organizations' mission statements and principles may conflict and prohibit cooperation. Second, a lack of sufficient resources during peak seasons reduces the general cooperation willingness.

The following four barriers are identified as the most critical impediments to horizontal logistics cooperation between humanitarian organizations: the conviction of some organizations that logistics belongs to their own core competencies, cultural differences and mistrust, a lack of transparency regarding existing and potential benefits and a lack of sufficient resources. The other impediments are either linked to these (e.g. the challenge of finding a reliable service provider is linked to and influenced by the level of mistrust), or are judged to be less critical (for example, conflicting missions and principles). Therefore, emphasis is put on developing facilitators to address the four main barriers.

4.3 Cooperation design

Although the three cooperation initiatives considered in the case studies work on the principle of cost recovery and strive for self-sufficiency, they are supported and partly funded by donations. This support distorts any competition between the individual initiatives and service providers. In addition, humanitarian service providers will have difficulty in equalizing the demand from their customers over time, since most of their services are requested at the same peak times. All in all, this might lead to services which are less efficient and effective than those deliverable by competitive commercial companies, which can balance out the varying demand from the humanitarian sector with customer demand from other industries, and employ the latest technology support systems. The cooperation format might therefore be adopted and tested by replacing humanitarian service providers with commercial logistics companies.

5. Summary and outlook

This paper investigates the types of benefits that horizontal cooperation between humanitarian organizations could produce in the field of disaster relief logistics, and the impediments that hinder the realization these benefits. Through a cross-case analysis of three logistics cooperation initiatives recently set up by major disaster relief and donor organizations, it can be concluded that the same potential synergies exist in the humanitarian domain as found in the private sector, but that not all of the possible benefits have yet been realized. Humanitarian organizations focus less on cost aspects than on lead-time and quality improvements. Smaller organizations, in particular, can benefit from the services becoming accessible through a cooperative approach. Four main impediments are identified that hamper cooperation willingness between

Category	No.	Potential impediment	Sources	Perceived impediment UNHRD network	RLUs	HPC concept	Result
Strategic fit	I-1	Organizations consider logistics as a core competency and are, therefore reluctant to become dependent on others	Razzaque and Cheng (1998) and Herrmann (2004), Agency Theory	Yes, WFP considers logistics as its core competency which it would not (totally) outsource to others; also some of the current users consider logistics as their core competency and are reluctant to give up their own infrastructure	Yes, logistics is regarded as a core competency by IFRC since it cannot afford to depend on others; outsourcing of single tasks to professional service providers is possible (and partly done); also larger NS consider logistics as their own core competency	Yes, especially the larger organizations wish to stay self-sufficient and regard logistics as a competitive advantage	Confirmed
	I-2	Cultural differences and mistrust can hamper the implementation and maintenance of cooperation initiatives	Bahrami (2003) and Beimborn (2007)	Yes, mistrust regarding the intentions of WFP exists	Yes, divergences between NS and between NS and Secretariat (can) exist	Yes, mistrust regarding long-term intentions of ECHO exist	Confirmed
	I-3	When an organization cooperates with commensurable organizations, it finds it harder to distinguish itself	Cruijssen *et al.* (2007)	Yes, but clear signs/logos in warehouses	No/yes, less within the RC movement; possibly for external customers	No information available	Confirmed, but linked to I-1
Partner selection	I-4	It is hard to find a reliable party that can coordinate the cooperation in such a way that all participants are satisfied	Cruijssen *et al.* (2007)	Yes, critics question neutrality and professionalism of service providers	No, within the RC Movement it is the natural role of the Federation's Secretariat	Yes, ECHO tries to enforce the principle of neutral customer treatment	Confirmed, but linked to I-2
	I-5	It is hard to determine and find commensurable organizations with which it is possible to form a horizontal cooperation	Essig (1999), Cruijssen *et al.* (2007) and Erdmann (1999)	No, increasing number of registered users	Yes/no, NS have to be convinced of the concept; some external organizations have already asked for services	Yes, number of customers seems to be still low	Confirmed, but linked to I-7 and I-2
	I-6	Competition between organizations hampers the willingness to enter and stay in inter-organizational logistics cooperation	Bahrami (2003)	No, cooperative attitude of users; increasing number of registered users; external pressure from donors	No, since all NS are part of the RC movement, some external organizations have already asked for services	No, not observed	Not confirmed
Determining and dividing the gains	I-7	It is hard to determine the benefits or operational savings before and during the horizontal cooperation	Bahrami (2003), Cruijssen *et al.* (2007) and Arnold (1998)	Yes, no benefit calculation available; no performance measurements system	Yes, existing benefit calculations are only estimates; no breakdown of logistics cost exist	Yes, no benefit calculation available; no performance measurements system	Confirmed

(*continued*)

Table V.
Overview of potential cooperation impediments

Table V.

Category	No.	Potential impediment	Sources	Perceived impediment UNHRD network	RLUs	HPC concept	Result
	I-8	Partners find it hard to ensure a fair allocation of benefits	Cruijssen *et al.* (2007)	No, since WFP is not allowed to make a profit and occupies less space in depots than community of users	No, since IFRC is not allowed to make a profit	No, since HPCs are not allowed to make a profit and also customers receive up to 7% cost recovery	Not confirmed
	I-9	Organizations will only be motivated to enter and remain with a horizontal cooperation if they expect and realize a positive individual net benefit	Essig (1999) and Bahrami (2003)	Yes, free storage as selling argument is still low	Yes, necessity to point out benefits to NS	Yes, clarification of cost recovery contributions was necessary; number of users	Confirmed, but linked to I-7
Negotiation positions	I-10	When benefits cannot be shared in a perceived fair way, the larger players will always benefit most	Cruijssen *et al.* (2007)	Yes, critical voices question neutrality of service providers; necessity for priority rules	No/yes, appreciation of problem does not exist regarding NS, possibly regarding external customers	Yes, critics question neutrality of service providers	Confirmed, but linked to I-2 and 1-15
	I-11	Over time, smaller organizations in the partnership may lose client support or get pushed out of the market completely	Cruijssen *et al.* (2007)	Yes, mistrust regarding remaining independence of choice exists	No, no intention to weaken NS, equal treatment of NS, general visibility through same logo	Yes, mistrust regarding remaining independence of choice exists	Confirmed, but linked to I-2
Technical preconditions	I-12	Cooperation is greatly hampered by the required indispensable ICT investments	Cruijssen *et al.* (2007) and Herrmann (2004)	No, basic ICT solution	No, basic ICT solution; no HLS access for national societies	No, basic ICT solution but barrier to employing advanced technologies for order tracking	Not confirmed
	I-13	Lacking logistics standards complicate any cooperation and harmonization efforts between organizations	Herrmann, 2004 and Beimborn (2006)	Yes, necessary for stock swaps, not easy to agree on	Yes, necessary for stock swaps, but common items catalogue exists	Yes, customers have to accept the standards set by HPCs	Confirmed
Additional impediments	I-14	The organizations' mission statements and principles can conflict with a cooperation involvement		Yes, theoretically, but no critical cases among (potential) users have occurred so far	No/yes, no problem for internal customers (= NS); possibly for external customers with conflicting status or mission	No, the availability of several HPCs makes it possible to choose a suitable partner	Confirmed
	I-15	Lack of sufficient resources during peak seasons		Yes, therefore building of physical, virtual and white stocks	Yes, therefore building of physical, virtual and vendor-consigned stocks	Yes, even declining number of suppliers due to unattractive economic conditions	Confirmed

organizations: These are: the perception of logistics as one of the organization's own core competences, cultural differences and mutual mistrust, a lack of transparency concerning the potential and existing benefits and inadequate relief capacities.

In addition, due to the perceived substantial net benefit, it is advisable that all humanitarian actors, and especially humanitarian organizations, donors, commercial service providers and the media place greater interest in the possibilities and potential results of horizontal logistics cooperation between humanitarian organizations. An initial fact-based discussion is required in order to evaluate alternative cooperation formats and identify potential benefits and costs, and also to facilitate long-term cost efficiency and existing impediments and solutions.

The cross-case analysis revealed strengths and weaknesses of the selected cooperation model. In particular, the lack of incentives for cost efficiency, and the hypothesis that commercial service providers are able to operate in a more cost-efficient way than public or humanitarian service provider. This leads to a discussion of whether the service provider role in the cooperation can and should be taken on by a commercial company. While no viable reasons seem to preclude such a move, cost efficiency might be improved. Thus, the use of commercial instead of humanitarian service providers should be investigated and evaluated from the perspective of long-term efficiency.

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About the authors

Sabine F. Schulz completed her PhD thesis in 2008 at the Logistics Department at the University of Technology Berlin. Her research focuses on the area of inter-organizational cooperation and performance measurement within the area of disaster relief logistics. She holds a graduate degree in Business Administration from the University of Passau. Since 2004, she has been working as a Consultant for McKinsey & Company, Inc. where she focuses on operations and supply chain management in the pharmaceutical industry as well as in health care systems. Sabine F. Schulz is the corresponding author and can be contacted at: sabine.schulz@logistik.ww.tu-berlin.de

Alexander Blecken is a Logistics and Information Technology Consultant. He obtained his MSc degree in Electrical Engineering and Computer Science from the University of Southern California and his PhD in business computing and supply chain management from the University of Paderborn. He worked with DaimlerChrysler in research and development before joining the humanitarian aid organization Médecins Sans Frontières (MSF) in 2005. He has also worked as Logistician and Project Coordinator in the field and currently serves on the board of directors of the German section of MSF. At the Heinz Nixdorf Institute, he pursues his research interests and publishes on issues related to humanitarian logistics, supply chain management and process modelling and optimisation.

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